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AEROSPACE AND DEFENCE

ALBERTA CANADA

Government of Alberta

A Vector to Diversity:
Alberta's Aerospace and Defence Industry Strategy

A Vector to Diversity: Alberta's Aerospace and Defence Industry Strategy

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A Vector to Diversity

Alberta's Aerospace and Defence Industry Strategy

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MESSAGE FROM THE MINISTER

The Government of Alberta believes the province's aerospace and defence sector will provide the economic diversification and growth necessary to keep Alberta strong and relevant in the global economy. The Alberta government developed this sector growth strategy, *A Vector to Diversity: Alberta's Aerospace and Defence Industry Strategy*, with industry, academia, and governments at the regional, provincial and federal levels – a collaborative effort that is indicative of Alberta's spirit of entrepreneurial cooperation.

This strategy outlines the vision and goals that stakeholders agree are vital to making this sector a viable and substantial part of a robust, diversified Alberta economy. By agreeing on the specific long-term goals and collaboratively dividing responsibilities, the Government of Alberta will be able to take on initiatives, and work towards our shared goals – growing the sector in a globally competitive market and diversifying Alberta's economy.

The economic challenges of late have reinforced our belief that Alberta must prepare for the long term sustainability and profitability by simultaneously reinforcing success and investing in diversification. To continue Alberta's strong heritage of offering a competitive economy, the Premier has charged me, along with the ministers of Advanced Education and Technology and International and Intergovernmental Relations, with enhancing value-added activity, increasing innovation, and building a skilled workforce to improve the long-run sustainability of Alberta's economy. The aerospace and defence sector is one way to help achieve this, and this strategy is an excellent launching pad to grow opportunity.

This strategy is meant to provide a long-term commitment to the sector, independent of short-term economic fluctuations, by setting purpose and the alignment of effort amongst stakeholders. A subsequent action plan will be produced to implement the strategy – a plan that ties actions to our goals and refocuses programs where able in order to make progress within the realities of the prevailing economic environment. The Government of Alberta recognizes that the fiscal challenges of today's economy will make introducing new programs difficult in the short-term, so this strategy will focus on the realignment of existing programs and services, and set the stage for the future.

My thanks to those that helped create this strategy and I encourage all interested in aerospace and defence to continue to stay engaged and help implement this vision of leveraging Alberta's intellectual capital to globally dominate the niches in which we already have strength.

Ted Morton
Minister of Finance and Enterprise

Executive Summary

Alberta has a strong foothold in aerospace and defence, an industry that contributes $1.3 billion in revenue to the Alberta economy, is home to 5,000 jobs exclusive of the airlines and airports, and exports 40% of its products and services. Alberta's aerospace and defence industry is an emerging knowledge-based, high-tech, value-adding sector for the province. Alberta is proud to continue the strong Canadian heritage that the aerospace and defence industry exemplifies by developing opportunities within certain niche clusters, namely: robotics and unmanned vehicle systems (UVS); defence electronics; space science and aerospace geomatics; manufacturing, maintenance, repair and overhaul (MMRO); and logistic support to the military.

The aerospace and defence sector is one of a group of advanced industries that the Government of Alberta recognizes as adding significant value, innovation, and diversification to the provincial economy. Diversification into aerospace and defence is important to Alberta for a number of reasons: the sector employs highly qualified and skilled workers; it shares many of the same technologies used in other high-tech fields (nanotechnology, information and communication technology (ICT), advanced materials); and, it is an environmentally conscious industry. In short, the aerospace and defence industry is a green field that provides another home to Alberta's advanced technology and employees beyond the oil and gas sector.

The aerospace and defence sector enhances value-added activity, increases innovation, and builds a highly skilled workforce that will improve the long-term sustainability of Alberta's economy. In keeping with its priorities and mandates, the Government of Alberta developed *A Vector to Diversity: Alberta's Aerospace and Defence Industry Strategy*, through collaboration with a diverse and committed group of stakeholders including: individual companies, industry associations, post-secondary institutions, non-governmental organizations, and multiple departments within the governments of Alberta and Canada. This strategy highlights the key strengths of the sector, and provides the vision and goals that will guide the policies and priorities of stakeholders, thereby ensuring that the sector is globally competitive, more robust, profitable, and innovative. Identifying the short and long-term economic, social, political, and technological trends facing the industry allows stakeholders to establish initiatives that will bring Alberta's aerospace and defence industry to the forefront of a strong and diversified provincial economy.

Following this strategy, an aerospace and defence action plan will be developed to articulate and prioritize the appropriate Alberta government initiatives which will, in cooperation with privately-led initiatives, achieve those goals. Figure 1 gives a graphic depiction of how the overall strategy and action plan will relate to each other.

FIGURE 1: Strategy and Action Plan Overview

A VECTOR TO DIVERSITY:

Alberta's Aerospace and Defence Industry Strategy

PART I:

Where are we?

Aerospace and defence is a source of provincial and national pride. With the same sense of pioneering and entrepreneurship that built the West, Canadian aviators, engineers, and businessmen have built Canada's aerospace industry into the fourth largest aerospace industry in the world, just behind the United States, France, and the United Kingdom,[1] and created $23.6 billion in revenue and 83,000 jobs nationally.[2] The majority of this revenue (80%) is exported to foreign markets. Canada ranks third most competitive in average location-sensitive costs in the aerospace sector, behind Mexico and Australia – Mexico has the lowest labour, transportation, utility and tax costs.[3] Although the heartland of Canada's aerospace and defence sector is in the province of Quebec, Alberta's industry association (Aviation Alberta) has joined other western provincial aerospace and defence associations to form the Western Aerospace Alliance – an association that works together in establishing a more even distribution of aerospace technology across the nation. Alberta has led the way in bringing aerospace and defence to the West and is poised to bring more.

Alberta has a strong foothold in aerospace and defence, an industry that contributes $1.3 billion in revenue to the Alberta economy, is home to 5,000 jobs exclusive of the airlines and airports, and exports 40% of its products and services.[4] Although firms in Alberta's aerospace and defence industry are generally classified under two NAICS[5] codes – aerospace product and parts manufacturing (NAICS 3364) and support activities for air transportation (NAICS 4881) – there are many firms that do not readily fit into the NAICS classification system but are still very active in Alberta's aerospace and defence industry. Currently, the Government of Alberta is working alongside Aviation Alberta on an industry database and cluster mapping initiative that aims to better identify the scope and range of firms that make up Alberta's aerospace and defence industry sector.

With the lowest corporate tax rates in all of Canada (10%), Alberta has a relative comparative advantage over other provinces. In addition, Alberta has no municipal or provincial sales tax, and no inventory, machinery, equipment, or payroll tax. Alberta is also the only Canadian province to

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1 Aerospace Industries Association of Canada, 2006.

2 Aerospace Industry Association of Canada, *"Aerospace Industry Association of Canada Statistics,"* www.aiac.ca/canadas-aerospace-industry/industry-statistics.

3 KPMG, *"Competitive Alternatives: KPMG's Guide to International Business Location - Aerospace,"* 2008 Edition.

4 R.P. Erickson & Associates, *"Alberta Aerospace Sector 2005,"* May 3, 2006, 4.

5 NAICS codes are industry codes within the North American Industry Classification System (NAICS).

have a flat income tax rate, while all other Canadian provinces work on a sliding scale. Alberta's beneficial tax regime creates an environment in which aerospace and defence businesses can operate more profitably in Canada.

Alberta industry, academia, and government are working together to seek out ways to increase the growth throughout the sector. This partnership has already succeeded in creating sector niches where Alberta has a reputation for national and global excellence. Alberta's strengths include:

- Robotics and unmanned vehicle systems (UVS);
- Defence electronics;
- Space science and aerospace geomatics;
- Manufacturing, maintenance, repair, and overhaul (MMRO); and
- Logistic support to the military.

Robotics and Unmanned Vehicle Systems

Unmanned vehicle systems (UVS) development is a rapidly emerging sub-sector with huge potential in a $40 billion global market, $787 million of which was earned in Canada in 2007.[6] Within the province, there are more than 70 companies, military agencies, and educational institutions engaged in various forms of UVS research, testing, development, and manufacturing.[7] Especially strong skills exist in control systems, wireless communications, miniaturization, avionics, and systems integration.

The strategic importance of this niche continues to grow as technology advances beyond military use and into civilian commercial and industrial applications, e.g., pipeline surveillance, forestry monitoring, agricultural hyperspectral imaging, law enforcement, etc. In fact, a 2007 study of the industry by the Association of Unmanned Vehicle Systems International noted that 70% of Canadian companies expect to generate commercial revenue over the next 10 years, and could be earning 50% of their revenue from commercial sources by 2018.[8] To assist in this growth, the Alberta government invested in the Canadian Centre for Unmanned Vehicle Systems (CCUVS) in Medicine Hat to facilitate sustained profitable growth, including commercialization of the UVS sector.

Further growth could be realized in this niche by investing in:

1) *Ways to accelerate the transition to civilian use of unmanned vehicle systems; and,*
2) *Collaboration of industry, government, and academia to both further robotics Research and Development (R&D) and enhance the technical capabilities of unmanned vehicles.*

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6 AUVSI Canada, *"AUVSI-Canada 2007 Stakeholder Survey Report,"* September, 2008, 7.
7 PriceWaterHouseCoopers, *"Alberta Industry Sector Performance and Prospects,"* May 2009, 130.
8 AUVSI Canada, *"AUVSI-Canada 2007 Stakeholder Survey Report,"* September, 2008, 4.

Defence Electronics

Currently there are 12 Alberta firms in this sub-sector, employing approximately 1,200 highly-qualified and skilled people. This niche generates $264 million worth of products, of which 60% of the products are exported.[9] Alberta companies are making and maintaining the Canadian Forces' communications systems, software, specialized sensors, and other electronic components used in military applications.

This niche, like the others within aerospace and defence, is at risk of losing its highly qualified people to jobs in oil and gas, or more "Silicon Valley" type locations globally.

There is opportunity to mitigate this risk by:

1) *Ensuring that a defence-focused industry association leads efforts to address the skills migration other fields and locales;*
2) *Developing a human resources strategy unique to defence industries; and,*
3) *Investing in research and development to retain and attract highly qualified people to the sector.*

Space Science and Aerospace Geomatics

Alberta has over 25% of Canada's geomatics, navigation and positioning firms, employing 7,300 employees, although a number of these companies are using ground-based geomatics techniques. Space related products and parts account for $200 million in revenue, of which 75% is exported to the United States and Europe.[10] Between the universities of Alberta, Calgary, and Lethbridge, the collective provincial expertise in the areas of space physics, space instrumentation, imaging, and space materials is unmatched by any other jurisdiction in Canada.

University researchers serve as mission scientists for many of the Canadian Space Agency's core programs, as well as for both current and future missions scheduled for launch by the United States' National Aeronautics and Space Administration (NASA), the European Space Agency, the Japanese Space Agency, and the Brazilian Space Agency. Alberta's universities account for almost 50% of the national Natural Sciences and Engineering Research Council of Canada (NSERC) funding for the study of space science. These Alberta organizations employ highly-qualified and skilled people to produce products and services to a segment that uses satellite and near-space technology.

This niche has significant growth potential as the Canadian Space Agency sets its course for the future and looks for strategic partners across the country. Internationally, space exploration and use of earth orbiters is increasing. Canadian and U.S. expenditures related to the development

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9 R.P. Erickson & Associates, *"Alberta Aerospace Sector 2005,"* May 3, 2006, 8.

10 Diane Lougheed-Keefe, *"Assessment of Alberta's Geomatics Industry,"* March, 2007, 39.

of exploration systems are expected to almost double by 2012; similar growth is also expected by the European Union, Japan, and emerging powerhouses on earth observation such as Brazil. As militaries become more "information hungry" for real-time imagery, oil and gas companies continue their northern exploration, government and forestry companies require updated information on the state of our forest ecosystems, and the opening of the Arctic's waterways creates new navigational challenges, this Alberta niche will grow in academia and industry.

Growth of this segment is contingent on:

1) *Recruiting and retaining highly-qualified and skilled people;*
2) *Creating and maintaining momentum in the creation of new technologies and applications that will allow Alberta to dominate this niche; and*
3) *Enhancing ongoing work to create a formal collaboration between the Canadian Space Agency and the universities of Alberta and Calgary.*

Manufacturing, Maintenance, Repair, and Overhaul (MMRO)

MMRO is a niche of the Alberta's aerospace sector that has long been its backbone. On the maintenance, repair, and overhaul (MRO) side, 27 Alberta firms, employing 3,500 highly-qualified engineers and technicians, generated $493 million in revenues in 2005.[11] Alberta-based companies provide maintenance, repair, overhaul and modification of both military and commercial aircraft, including: avionics; airframes; engines; equipment and component parts; interior refurbishment; and, aircraft painting. Aerospace manufacturing is a technologically advanced industry that produces various components such as aircraft parts, aircraft engines, propulsion units and related parts. Alberta's aerospace manufacturing industry is generally made up of small companies that create highly specialized products.[12]

This niche has experienced strain in recent years as major companies and air forces recapitalize their fleets to newer aircraft with more complex systems, requiring more qualified technicians and an increase in component replacement rather than in location repair. Additional stress is placed on Alberta companies by the rising prevalence of lower-priced MMRO services from companies in southeast Asia. However, at the same time some companies are leaving the MRO niche in Alberta, new entries are being made into this niche by companies interested in exploiting their excess capacity.

This niche can regain its dominance by:

1) *Investing in specialized aeronautics education;*
2) *Providing trade and investment attraction assistance to companies; and,*
3) *Assisting in business development as companies transform to stay relevant in the changing global business climate.*

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11 R.P. Erickson & Associates, *"Alberta Aerospace Sector 2005,"* May 3, 2006, 6.
12 The Conference Board of Canada, *"Alberta Industrial Outlook: Aerospace Sector,"* November, 2005, 6.

Logistic Support to the Military

Four of the most important military bases in Canada are located in Alberta:

- Canadian Forces Base (CFB) Edmonton is home to the headquarters of both Land Force Western Area and Joint Task Force West;
- CFB Cold Lake is the Canadian premier fighter aircraft training facility;
- CFB Wainwright is the Canadian Army's centre of excellence for training; and,
- CFB Suffield is one of the largest military training areas in the world.

In addition to the bases, other significant military presence in eastern Alberta includes: the British Army Training Unit located at Suffield; Defence Research and Development Canada at Suffield; and, the Aerospace Engineering Test Establishment at Cold Lake.

Collectively, these bases bring more than $10 million in local procurement of products and services to Alberta's economy. Alberta offers unique advantages and opportunities for defence companies: excellent flying weather, some of the best instrumented test ranges in the world, and, a strong federal defence research and development capability. These bases provide room for large scale manoeuvres by international militaries, and are essential to providing pre-deployment training to the Canadian Forces. Recent success in Alberta government-provided procurement seminars, which educate and assist local businesses, have increased the number of local suppliers to the Department of National Defence (DND).

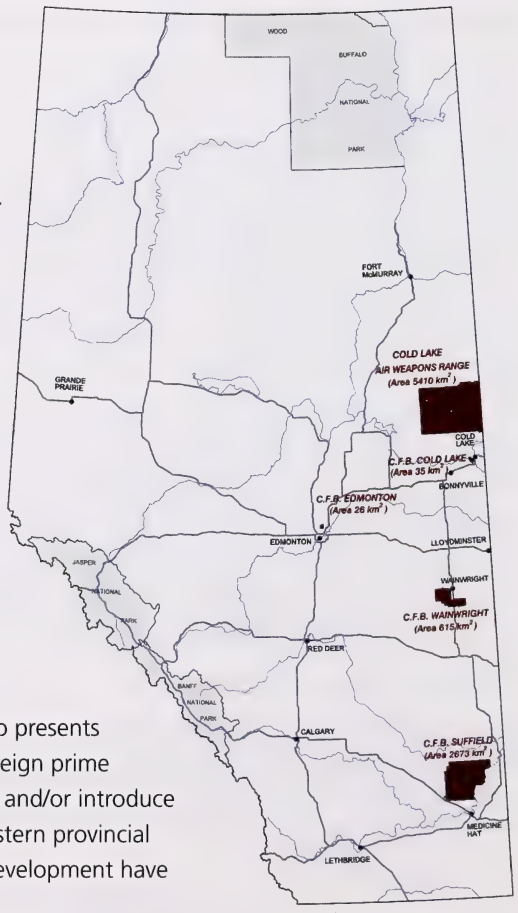

Figure 2 on the following page clearly demonstrates that there is room to grow Alberta's piece of the DND procurement pie.

Related to defence procurement, the federal Industrial Regional Benefits (IRB) program also presents opportunity to Alberta businesses - DND's foreign prime contractors must invest in Canadian business and/or introduce them into their supply chain. Federal and western provincial Deputy Ministers responsible for economic development have

established a working group on industrial and regional benefits that will serve as a forum for identifying areas of common interest, and sharing information related to federal procurement opportunities. This forum will be useful in identifying opportunities for Alberta.

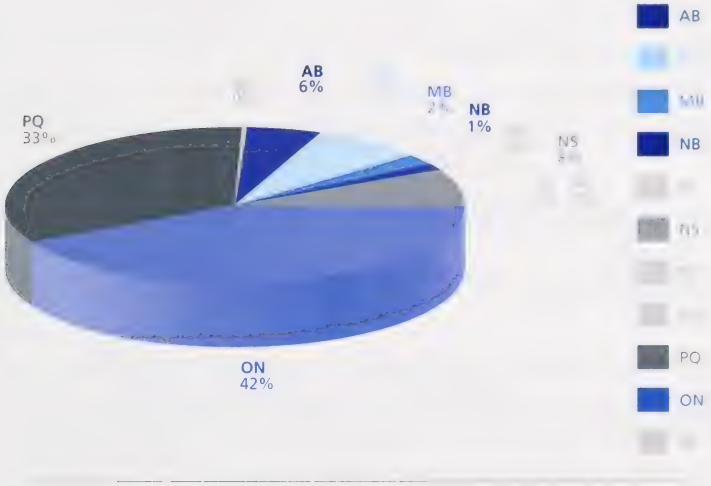

FIGURE 2: Total DND Procurement by Province

Includes local base procurement and national contracts
(As provided by DND's Material Group in October, 2008)

Alberta's $56.4 million is 6% of the $1,022.6 million spent nationally

There is potential for this niche to grow as Alberta companies become more comfortable and competent in the military procurement process and begin to compete for national contracts rather than just local procurement. Continued growth can be encouraged by:

1) *Developing and delivering training seminars for defence procurement across the province; and,*
2) *Conducting supplier development workshops and marketing in order to ensure that foreign companies are attracted to the Industrial and Regional Benefit (IRB) potential in Alberta.*

Niche Cluster Support

Apart from the five niche clusters identified above, Alberta has four other areas that are noteworthy in their direct support to the provincial aerospace and defence industry, but which cannot be classified as niche clusters in their own right.

- Aerospace Infrastructure;
- Alberta's Aerospace/Aviation Heritage;
- Aerospace Education;
- Training Capacity;

Aerospace Infrastructure

Alberta has a vast network of airports to service the movement of people and cargo within the province.

- In Alberta, there are 72 community airports, 12 regional airports, two international airports, one military airport, and one military heliport. By passenger movements, Calgary and Edmonton are the fourth and fifth busiest airports in the country. By aircraft movements, Calgary ranks as the third busiest and Edmonton as the sixth.[13]

Alberta's international airports are governed by airport authorities that are aggressively pursuing growth of their existing market share and expansion into new markets. For example, initiatives that can increase the growth in cargo handling and routing within Alberta, or increase the ease and frequency of international travel, or can set the conditions for industrial success in the province.

The prosperity of Alberta's aerospace infrastructure can be enhanced by:

1) Supporting airport infrastructure; and

2) Helping regional and local airport initiatives to diversify.

Alberta's Aerospace /Aviation Heritage

Alberta is home to the Canadian Aviation Hall of Fame and six aerospace museums, which together house the largest collection of aviation heritage in Canada. While not a significant economic powerhouse within the sector, the economic impact that Alberta's aviation heritage generates in some of Alberta's smaller communities is significant where those communities house museums or host airshows and tradeshows.

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[13] PriceWaterHouseCoopers, *"Alberta Industry Sector Performance and Prospects,"* May 2009, 131.

Alberta's aviation heritage plays a critical role in shaping the labour force of tomorrow by attracting new technicians, engineers, businessmen and innovators into the sector. More so than any other industry group, aerospace and defence can exploit its proud Alberta heritage, through programs like cadets and investment into museums, in order to incubate the highly qualified people the sector will need tomorrow.

Aerospace Education

While lacking any specific aerospace engineering degree programs, the universities of Alberta, Calgary, and Lethbridge offer programs that benefit and strengthen the sector, as do the province's colleges:

- The University of Calgary has expertise in space science, navigation and positioning, and security. The University is home to:
  - The Institute for Space Imaging Science (joint with the University of Lethbridge);
  - The Department of Geomatics;
  - The Centre for Information Security and Cryptography;
  - The Autonomous Reconfigurable/Robotics Systems Laboratory (which promotes UVS technology developments);
  - The iCORE Information Security Lab;
  - The Biometric Technologies Laboratory; and,
  - Researchers participating in the Canadian Centre for Unmanned Vehicles Systems that was recently set up in Medicine Hat.
- The University of Alberta also has a variety of institutions with aerospace and defence expertise, such as:
  - The Institute for Space Science, Exploration, and Technology;
  - The Canadian Centre for Earth Observation;
  - The Alberta Ingenuity Centre for Machine Learning (possible applications in defence electronics);
  - The National Institute for Nanotechnology (partnership with the federal government); and
  - The Centre for Frontier Engineering Research (CFER), a spin-off of the University of Alberta which has the facilities and expertise for large airframe testing. CFER is now a division of the Alberta Research Council.
- The University of Lethbridge is also involved in the aerospace industry sector, having established the Alberta Terrestrial Imaging Centre and partnered with the company Iunctus Geomatics Corp. The University of Lethbridge also partnered with the University of Calgary to create the Institute for Space Imaging Science (ISIS), a unique national institute that researches the origin and evolution of structure in the universe. ISIS is also involved with the

European Space Agency's Herschel Space Observatory in developing the largest mirror ever built for a space telescope.

- The Northern Alberta Institute of Technology (NAIT) and the Southern Alberta Institute of Technology (SAIT) are designated training organizations under Transport Canada, and their programs are accredited by the Canadian Aviation Maintenance Council (CAMC).
  - NAIT offers two programs: Avionics Engineering Technology; and, Aircraft Skin and Structures Repair; and,
  - The Art Smith Aero Centre at SAIT has three programs: Avionics Technology; Aircraft Structures Technician; and Aircraft Maintenance Engineering Technology.
- Mount Royal University offers an Aviation Diploma Program.
- All of Alberta's colleges also offer programs that compleiment aerospace and defence industry, such as applied engineering, manufacturing, information technology/management, etc. Many of them also offer applied research services to help industry with product development.

Alberta's post-secondary education community is interested in increasing the colloboration with industry to enhance and create new opportunities for the sector, especially in terms of research and development. As previously mentioned, Alberta's share of the national research and development is noteworthy, as the following figures demonstrate:[14]

The Government of Alberta will continue to provide support and assistance to its educational networks encouraging collaborative research and development partnerships between post-secondary institutions and industry.

NSERC Funding by Subject 2007

$ Thousands	Alberta	Canada Share
Aerospace & aeronautical sciences	138	4.3%
Robotics	337	5.4%
Space sciences	840	45.3%
Wireless	602	19.3%
Astronomy & astrophysics	769	8.3%
GIS & GPS	663	24.6%
Atmospheric science	219	4.0%

NSERC Funding by Application 2007

$ Thousands	Alberta	Canada Share
Aerospace & auto	55	1.3%
Space & astronomy	1290	17.4%
Communication technologies	763	10.0%
Instrumentation technologies	358	10.9%
Communications equipment	26	1.1%
Climate & atmosphere	733	11.5%

[14] Diane Lougheed-Keefe, *"Alberta Aerospace and Defence Industry Strategy,"* February, 2008, 18.

Training Capacity

Alberta's domestic strengths in aerospace education are also reaching international markets. Alberta has a long-standing international reputation for providing quality, cost-effective flight training for aviation professionals from around the world, dating back to the British Commonwealth Air Training Program of World War II. In recent years, demand from outside Canada for Alberta's flight training program has increased, especially from southeast Asia, India and China due to a lack of indigenous training capacity. International students are being sent to Alberta to receive formal flight training (e.g., Sky Wings Aviation Academy in Red Deer). In addition, CCUVS offers a training program for unmanned aerial vehicle systems, the first of its kind in Canada and one that has the potential to spur international interest.

PART II:

Where are we going?

The overall trend affecting the global aerospace and defence industry is one that sees increased demand for the sector's products and services despite today's current economic realities. Global predictions by the Aerospace Industries Association of Canada see sector revenues reaching $2.8 trillion by 2026, with an annual increase in passenger air traffic of 4.9%, per year.[15] Asia Pacific aircraft purchases will rise by 31-36% by then, bringing with it an equivalent demand for aircrew, engineers, aircraft production and their associated sub-systems.[16] Unfortunately, there is also a current global trend of insufficient investment into the training and attraction of highly qualified people into the sector, insufficient R&D investment, and a shift of aerospace development focus from Europe and North America to Asia - a shift that pulls technology, jobs, and people out of Alberta and Canada. Specific trends include:

Economic Trends

- **Rising costs.** With oil, steel and other commodity costs fluctuating, and increasing use of advanced materials, composites, and miniaturization/nanotechnology, many costs in the aerospace and defence sector's products and services are rising. This trend will likely have a moderating effect on air travel and cause an increase in user fees charged by airlines. It will also mean that jurisdictional differences in subsidies and incentives will play an increasing role in recruiting and retaining business.

  A detailed review of Alberta's policy on subsidies and industrial incentives may produce some yet unrealized jurisdictional advantages that could help Alberta industry mitigate the effects of rising costs.

- **Globalization.** North America is seeing more and more movement of manufacturing and assembly functions to jurisdictions with large inexpensive labour pools such as Mexico, India, and southeast Asia.

  The collaborative nature of this strategy, along with the resource commitment to implement it, will create an environment of government support that will help keep these firms in Alberta. There is also opportunity for Alberta companies to become the face of the province in international partnerships with some of these foreign competitors.

- **Defence Spending.** The sector has profited from a surge in defence spending by Western nations, as they transform from a post-Cold War cost-savings mentality to one where they

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15 Aerospace Industries Association of Canada, *"Annual Survey: Current Market Outlook Boeing 2007-2026."*

16 Ibid.

must restructure and re-arm to face the challenges of the global war on terror. Coincidental to these reinvestments is the spending required to maintain efforts in Afghanistan and Iraq.

These defence expenditures are forecast to remain high for the coming years; Alberta's aerospace and defence industry can exploit this trend. Continued training and exposure to defence procurement tools will help marry up opportunity with Alberta business. A strong provincial industry association, with representation at the national Canadian Association of Defence and Security Industries, will ensure equitable distribution of Industrial Regional Benefits.

Social Trends

- **Demographics.** Although the impact of the 2008-09 recession on retirement ages has not been fully determined, previous studies forecast that the next 10 years will see a marked increase in the number of retirements within the Baby Boomer generation, creating significant recruiting and retention challenges for Alberta companies. Industry Canada estimates that, "by 2016, only 40% of the current manufacturing workforce and less than one-third of current aircraft maintenance engineers will be on the job. It has been estimated that moderate future growth rates of up to 2% annually in manufacturing will require up to 62,000 skilled workers by 2016."[17]

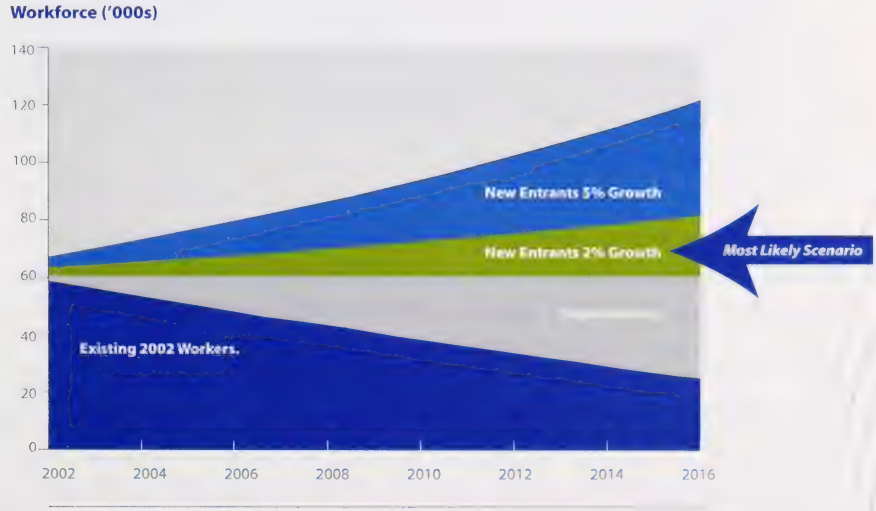

FIGURE 3: Aerospace Industry Workforce Forecast for 2002–2016*

At a modest 2% growth rate, the industry will need an additional 62,000 skilled workers

*Forecast based on 2 and 5 percent annual industry employment growth.
Source: Industry Canada, *"National Aerospace and Defence Strategic Framework,"* 2005.

17 Industry Canada, "National Aerospace and Defence Strategic Framework," 2005, 17.

The generation coming into the workforce between now and 2015 is a mixture of what are popularly referred to as "Generation Y" and "Generation Z". While there is some debate on the accuracy, many sources forecast this new cohort to be a much more mobile, "me-focused" generation that will switch locations, jobs, even careers to pursue the best opportunity for themselves. They will also bring a love of technology, an openness to change, and a willingness to challenge paradigms.

While this presents challenges to the industry's HR departments, it is an opportunity for Alberta to label itself as a location of choice for smart engineers, technicians, and program managers interested in being in an aggressive, rewarding climate within the aerospace and defence industry.

- **Education.** Alberta's aerospace and defence industry is facing a number of human resource challenges. One example is the ratio of aerospace engineers to aerospace technicians in Alberta compared to the rest of Canada. The province only has one aerospace engineer for every 20 mechanics, compared with one engineer for every six mechanics in Canada, and a one to one ratio in the United States.[18]

Canadian Workforce by Field of Education[19]

	Alberta	Canada
Aerospace engineers	120	5685
Aircraft instrument, electrical, avionics mechanics	695	8820
Aircraft mechanics/inspectors	1770	15300
Aircraft assemblers/inspectors	55	10415

According to numerous stakeholders in Alberta's aerospace industry, stakeholders can help mitigate the human resource challenges by actively promoting and developing the various aerospace and space related programs at its post secondary institutions.

- **Security.** Most analysts agree that the future security environment will see increased threats from terrorism, illegal border and port activity, pandemics, international crime, and cyber warfare (in terms of both industry manipulation and national security).

  This will lead to increased spending on the latest technology and procedures to counter these threats, thus a trend of which Alberta defence-oriented businesses can take advantage.

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18 Diane Lougheed-Keefe, *"Alberta Aerospace and Defence Industry Strategy,"* February, 2008, 16.

19 Statistics Canada, "Science Statistics: Industrial Research and Development 2004 to 2008," September 2008 Edition, Catalogue 88-001-X, 7.

Political Trends

- **Export Controls.** While export controls are protecting the nation's security-related technologies and intellectual property, they are complex and continue to slow international business development. The U.S. International Traffic in Arms Regulations (ITAR) control the cross-border flow of U.S. security-related goods. In some situations, goods are determined to have both a civilian and a military use, and these "dual use" technologies are restricted even if they are going to a civilian application with the end-user.

  The delays and bureaucracy surrounding ITAR controlled goods is significantly increasing the demand for non-ITAR controlled alternative sources for supply and many militaries are diversifying away from U.S. suppliers. Alberta businesses (particularly in the high tech fields) can aggressively seek out these opportunities.

- **Government Support.** The aerospace and defence industry is viewed federally as a strategic industry with significant financial support for R&D from the federal government. In fact, a Statistics Canada report in September of 2008 notes that Canada spends $900 million in aerospace and defence R&D.[20] This same study points out that industry investment in R&D is predominantly in large companies that have more than $400 million in revenue and/or 2,000 or more employees. Furthermore, most of the R&D is focused in Quebec (40%) and Ontario (39%), while only 6% of R&D performers are in Alberta.

  Public support to the aerospace and defence sector is not unique to Canada. One need only look at the enormous military industrial complexes in Europe and the US, or the subtle state-backing of companies like Embraer in Brazil, or more overt backing of companies like IAI in Israel. As Aviation Alberta pointed out in the development of this strategy, "the amount of public investment into a jurisdiction's aerospace sector is the single biggest determinant of the jurisdiction's influence and long-term viability; it can't compete globally without government's help."[21]

  This is one of the factors that make public investment into R&D so important; government needs to ensure the bright ideas in Alberta's small and medium enterprises are captured. Jurisdictions that want an aerospace and defence industry have to be prepared to invest heavily to attract and retain companies in this sector.

  The expansion of Alberta's aerospace and defence sector relies on the continued cooperative efforts of its stakeholders. For example, aerospace and defence technology has enormous amounts of non-recurring engineering costs, and often innovation and commercialization would be deferred by industry because the immediate costs are too large relative to the initial business case. In these cases, business often turns to government for assistance in offsetting these costs where the leap in technology research or the commercialization of a

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20 Statistics Canada, "Science Statistics: Industrial Research and Development 2004 to 2008," September 2008 Edition, Catalogue 88-001-X, 7.

21 Interview with Aviation Alberta's Executive Director, Summer 2009.

new technology would have a positive effect on the industry. Alberta, in cooperation with the federal government, needs to be prepared to assist in this manner, or risk losing business to provinces like Quebec who does help.

Stakeholders believe that this can be turned into an opportunity to create an Aerospace and Defence Research Network. The network would provide strategic advice, direction, and coordination of research and development within the aerospace and defence community of Alberta. Working collaboratively with industry and academia, the Aerospace and Defence Research Network would especially focus on space, electronics, sensors, robotics, and unmanned vehicle systems. The network would also ensure that Alberta's aerospace and defence industries are well-situated for the future, while at the same time assisting investment attraction globally.

Technological Trends

- **Nanotechnology.** Nanotechnology, and the means to exploit it, is one of the leading areas of defence R&D. Whether it is miniaturizing sensors, producing fire resistant coatings, making nano-switches and computers to lighten loads, using carbon fibre composites to build aircraft parts, or creating nano-bots to detect, repair and monitor damage in the human body, aircrafts or vehicles, nanotechnology holds the promise of being able to ensure Canada's security is done lighter, smarter and faster.

  Alberta is already a leader in nanotechnology research, with three major research universities, two biotechnology geo-clusters – Calgary and Edmonton, five research organizations, and 69 individual nanotechnology researchers. Alberta is also home to the National Institute of Nanotechnology (NINT), a joint partnership between the University of Alberta and the National Research Council. Alberta's strengths in nanotechnology can translate into opportunities for the aerospace and defence sector if the nanotechnology sector broadens its target market to include aerospace and defence.

- **Robotics.** Robotic technology has applications in the unmanned vehicle systems and space exploration sub-sectors of the aerospace and defence industry. It is also a critical enabler as companies embrace robotics to increase productivity in their facilities. Although unmanned aerial vehicles attract a lot of the attention, ground vehicles (surface and sub-surface) and oceanic systems (surface and sub-surface) have many applications in defence, oil and gas, mining, forestry, environment, and transportation. Of particular note, the need for robotics in the oil sands has only begun to be discussed.

  Alberta has positioned itself perfectly to take advantage of this trend by incubating the creation of the CCUVS and teaming it with the work of Alberta academia and research labs.

- **Alternative energy and energy efficiency.** Rising fuel costs, along with increasing global sensitivity to environmental impacts; including: and increasing energy demands, have produced a growing trend towards finding innovative ways of providing energy that is lighter, smaller, cheaper, and renewable. This trend has resulted in innovation in energy supply: mini/micro UAV battery packs; soldier systems' battery packs; future military vehicle fuel sources, and major airlines' fuel efficiency measures, to name but a few.

  The Government of Alberta has invested $239 million to execute its Nine-Point Bioenergy Plan, so it can better respond to industry's need for greener energy. To date, environmental gains are restricted to the ground applications surrounding airports; however, the aerospace industry is very interested in developing biofuels for commercial and military aircraft, and has embarked in national level research.

- **Imaging technologies and integrated computational support.** Many new and refined imaging technologies are now being rapidly developed through collaboration of industry, government and academia. Increasingly large and complex volumes of data are being produced by innovative land- and space-based imaging technologies resulting in significant changes in how we deal with all aspects of our environment including air, land, sea, and space. Extracting useful information from increasingly large volumes of data from these imaging technologies and networks is a huge data management challenge. This trend requires increasing amounts of computing support, dynamical real-time access, data analysis, and enhanced computational speed.

  Alberta companies can exploit this trend by understanding and supporting the integration of new technologies in imaging, sensing and computing, especially as they relate to information-based space and imaging science. Opportunities exist to commercialize these advances and to supply the advanced research being conducted at Alberta's universities and colleges.

- **High resolution satellites.** High resolution satellites, both multi- and hyper-spectral, provide significant contributions to geological exploration, target detection (key to military applications), and ecosystem management that have resulted in products of strong commercial value to the government, industry and military communities. In addition, significant academic expertise exists on the development of methods for calibration and validation of different types of high, medium, and coarse resolution sensors.

  Alberta is already a leader in post-secondary space science education and has a number of businesses and research facilities (e.g., University of Alberta's Centre for Earth Observation Sciences) positioned to exploit this trend. The creation of an Aerospace and Defence Research and Defence Network, or another vehicle to foster research and development collaboration, would provide focus and long-term direction to ensure further growth in this niche.

- **Sensors and intelligent networks.** Advanced sensors, including hyper-spectral imaging and bio-sensors, are being employed in aerospace and defence products.

  By combining the expertise in nanotechnology, information and communication technology, space sciences, and unmanned vehicles, Alberta will be able to compete aggressively as this trend continues. Government initiatives, like Productivity Alberta, in co-operation with the aerospace and defence sector team, will ensure the right collaborative networks are formed to exploit the available opportunities. Further efforts by Government to coalesce research and development activities in this sector would provide focus and long-term direction to ensure further growth in this niche as well.

- **Information Management.** As technology increasingly empowers wireless, real-time networks, demand is growing exponentially for better ways to manage and provide relevant information instantaneously. This is evident in demands for more satellite bandwidth, data compression and encryption, information taxonomy and retrieval software, verification technology, and the holy grail of information management – advanced layered and user-customizable fusion of data from multiple sources and in multiple formats.

  Large scale information management systems are normally the realm of large national or multi-national companies; however, in Alberta, potential exists for smaller networks to form a matrixed solution of smaller companies that could meet the needs of some of these larger multi-national led initiatives. The Alberta Information and Communications Technology Institute will also play a role in ensuring Alberta enterprise is positioned to exploit this trend. There is also large potential to leverage pre-existing Government of Alberta (GOA) investments in Information Communication Techonology (ICT) via investments in Alberta software companies.

Other national trends, described in Industry Canada's *National Aerospace and Defence Strategic Framework*,[22] of interest to Alberta include:

- **Productivity.** The relative lag in productivity in North America is a notable trend in the aerospace and defence industry sector, as pointed out in RNCOS' *Global Aerospace Market Forecast*: "Productivity is a critical factor for the growth of the aerospace industry. During the last decade, Europe has emerged as the second largest player in the aerospace industry [because of] relative efficiency...European aerospace manufacturers are starting to make major gains over their U.S. rivals in terms of competitiveness."[23] Simply put, Alberta needs to increase its efficiency in converting inputs to outputs if it wants to compete with Europe.

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[22] Industry Canada, *"National Aerospace and Defence Strategic Framework,"* 2005, 13-20.

[23] RNCOS Industry Research Solution, *"Global Aerospace Market Forecast (2006-2009),"* July 2006, 53. (Note: Original grammar fixed for reading ease).

The importance of productivity is reinforced by Industry Canada's *2005 Strategy Framework*, as depicted in the following graph comparing Canada's sector productivity to other nations.

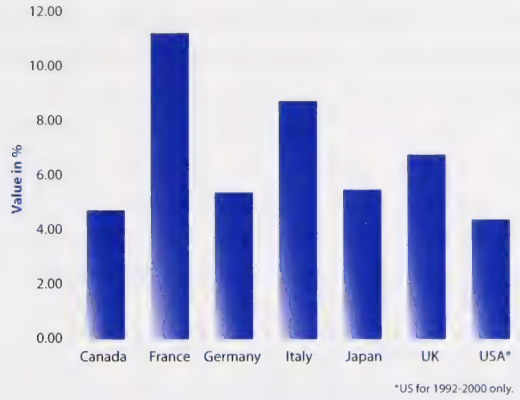

FIGURE 4: Aerospace Productivity
(Value-Added per Employee), by Country, 10 Year Average[24]
Annual Rate (1992-2001)

The Alberta government is a champion for productivity and is developing new policies and initiatives to take productivity, innovation, and competitiveness to new levels of awareness and application. Promoting the adoption of best practices, or using government services offered to the aerospace sector, will form a key component of the sector strategy aimed to foster increased industry competitiveness.

- **Manufacturing, Maintenance, Repair, and Overhaul (MMRO) Market.** Industry Canada's 2005 framework comments on the growing worldwide market for such services, especially in Asia and South America. It specifically suggests opportunities exist in non-labour-intensive MRO activities such as engine repair and overhaul.

  MMRO is already established as a niche aerospace market in Alberta. Industry stakeholders concluded that there are opportunities to help this niche by increasing innovation and productivity. By adopting new technologies and industry best practices in manufacturing, companies will be able to lower the number of labour hours, thereby making them competitive with global regions offering lower labour costs.

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24 Industry Canada, *"National Aerospace and Defence Strategic Framework,"* 2005, 16.

- **Maturing Product and Technology Base.** Technology is commonly measured in Technology Readiness Levels (TRLs), with TRL 1 meaning fundamental principles and TRL 9 referring to actual systems demonstrating successful mission operations and ready for commercialization. A trend that is happening globally is the maturation of the aerospace technology base; that is to say there are more products at the higher TRL level than there are at the low fundamental research stage. A maturing product base increases pressure to fund basic research and new product development. Without such innovation and new products, industry sales will ultimately decline, as will Canada's position in the global market. R&D pressure will exist in space development, and also aircraft manufacturing as the 50-seat regional jet market matures. Canada's leadership in robotics, space radar, space imaging and satellite communications is also threatened as other nations realign their space strategies and focus on competing in areas Canada has dominated.

  This trend can be turned to an opportunity by developing a strategy and actions towards integrated resource management of aerospace and defence technology.

- **Pressures on the Supplier Base.** One of the key challenges facing the Canadian industry is adapting to the changes taking place in the global supply chains for major domestic or international aircraft or weapon platforms. As the large manufacturing companies push responsibility further down the supply chain, Canadian firms must take on more design, finance, and risk responsibilities. When Canadian firms participate in foreign programs, they are often expected to cover their own non-recurring costs. Smaller Canadian suppliers often lack the human resource, financial and technical capacity to participate. In addition, smaller firms lack strong market recognition and global market presence on which to build.

  Without a significant amount of large multi-national manufacturers in the province, federal, provincial and municipal governments can play a role ensuring our small and medium enterprises (SMEs) remain competitive without suffering unfairly due to the national distribution of large multi-national manufacturers. Government and stakeholders could also dedicate resources to assist in sector-specific business development to facilitate strategic transformation, expansion, or development of SMEs.

- **Research and Development.** In the aerospace industry, sales have increased substantially in the past decade, but industry investment in R&D has not increased proportionately (see Figure 5). This has led to a major drop in R&D intensity[25] and a focus on product development. In general, there is a need for continuous investment in basic R&D to renew the technology base for the future. The level of pre-competitive collaboration in technology development needs to be improved.

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25 R&D Intensity is the ration of research and development investment compared to industry sales.

This can be turned into an Alberta opportunity by developing strategic direction, and coordination of research and development within the aerospace and defence community of Alberta. The Government of Alberta will also examine the possibility of establishing a communications plan in order to ensure that the lines of communication between Alberta's aerospace and defence industry and the broader business community remain open and transparent.

FIGURE 5: **Canadian Aerospace R&D Performance, 1994-2003**[26]

Alberta's Benefits

Alberta's aerospace and defence industry is comprised of more than 200 companies with the following competitive advantages:

- There is a very strong partnership between government (both federal and provincial), academia, industry, and associations that furthers the growth of the sector within Alberta;
- Niches of expertise and specialized talent in advanced and emerging technologies, often cross-pollinated from other sectors;
- A robustly competitive and entrepreneurial-minded environment;
- Stalwart support from the local educational infrastructure; and,
- A geo-strategic location with a strong local and provincial economy relative to the rest of Canada.

[26] Industry Canada, "National Aerospace and Defence Strategic Framework," 2005, 15.

Alberta's Challenges

While the advantages of the sector outweigh its weaknesses, there remain challenges that inhibit future growth:

- Research and Development:
  - Across the world, every other jurisdiction with a significant aerospace or defence industry uses aggressive combinations of subsidies, industrial incentives, or government contracts to stimulate R&D and support long-term company sustainability. While products at the higher Technology Readiness Levels (TRLs) can be funded by potential clients or research groups, investment in lower TRLs is more reliant on government funding to offset the large costs and risks associated with this very experimental level of technology.
  - Minimal aerospace and defence-specific innovation/commercialization support within the province.
  - Venture capital for aerospace and defence R&D is difficult to acquire.

  Although Alberta has some very effective R&D initiatives offered through the Alberta Ingenuity Fund and the Ministry of Advanced Education and Technology, the aerospace and defence sector has to compete with other technology fields for these resources. The Government of Alberta will continue to enhance its support to aerospace and defence sector-specific initiatives to ensure that the degree of sophistication and pioneering is not limited to those opportunities that are close to commercialization – and that the brightest aerospace and defence minds continue to make Alberta their home.

- Recruitment, Training and Retention. Many of the people with the knowledge, skills, and/or potential in aerospace and defence are either leaving the province for markets with a more robust aerospace and defence sector, or they are staying in Alberta, but working in the oil and gas sector.

  Next to R&D, this is the single biggest opportunity for Alberta. In keeping with the priority actions in Building and Educating Tomorrow's Workforce – Alberta's labour force strategy - stakeholders will need to promote the industry's heritage, engage youth at an early age, and partner with post-secondary education. By doing so, Alberta can create a workforce for tomorrow that is highly trained in aerospace and defence technology and motivated to stay in Alberta. Without the scientists, engineers, and technicians the required R&D, new enterprises, and investment attraction cannot be sustained. The Alberta government will continue to work with industry and academia to support the creation of jobs, education programs and technology centres.

- As noted earlier, the bulk of Alberta's aerospace and defence industry sector is made up of small and medium enterprises. These companies have difficulty overcoming the cost, and trade barriers associated with effectively marketing themselves overseas.

Increased resources and a more concentrated focus on investment attraction and trade for this sector by all stakeholders would allow Alberta to increase the globalization of the province's aerospace and defence SMEs' products and services. This investment would introduce local products to international markets while also attracting new investment from growing foreign markets.

Summary of Initiatives Deduced From the Preceding Factors and Trends

Alberta's aerospace and defence industry is off to a great start with an annual revenue of $1.3 billion, but there is still significant growth potential. While the oil and gas industry has brought Alberta much prosperity, it is prudent and fiscally responsible to maintain our efforts to diversify the economy and invest in other industries that can reinforce success. Aerospace and defence is just such an industry. In order to exploit the aerospace and defence successes to date, mitigate against some of tomorrow's risks, and take advantage of some of the opportunities in the industry trends, the following list outlines ideas that are deduced from the preceding trends, and which will be explored as the action plan to implement this strategy is created.

- As highlighted by numerous stakeholders, the Government of Alberta could dedicate resources to assist in sector-specific research and development through the creation of an Aerospace and Defence Research and Development Network. This network would be a partnership of industry, academia, research institutes, and government, and would provide aerospace and defence technology solutions and applications to issues in energy, environment, agriculture and forestry, health, and of course defence. A large portion of its activities would focus on furthering the partnership between Alberta post-secondary institutes and the Canadian Space Agency. The network would focus on the middle of the breadth of Technology Readiness Levels, from TRL 3 (proof of concept) to TRL 7 (prototype demo in operational environment). The network would also create more formal relationships with academia in order to develop the provincial labour force, develop specialized education for aeronautics and leverage/commercialize the research being done in Alberta's universities and colleges. Further feasibility assessments and consultations would be required before such an initiative could move forward.
- Promote Alberta Finance and Enterprise's *Productivity Alberta* program, a three pronged approach to addressing the productivity growth challenges that are facing Alberta, specifically focusing on providing productivity education and awareness, productivity enhancement tools along with policies to promote and enhance productivity and innovation across Alberta's SMEs;
- Invest in ways and means that accelerate the use of robotics and unmanned vehicles in the civilian market in Alberta, in order to expand the market size;

- As reinforced by stakeholders, a more robust trade and investment attraction program could be developed to assist SMEs, particularly where Alberta enterprise presents an alternative supply source to some of U.S. trade-restricted defence products;
- Promote cross-sectoral market expansion among Alberta's other high-tech industry sectors with a view towards broadening their markets;
- Ensure that Alberta's aerospace and defence industries have a robust industry association to facilitate collaboration and co-operation amongst them, as well as to act as a regional advocate nationally. The association(s) would also serve as a valuable vehicle for government to assist the sector without singling out any one company;
- Develop a human resources strategy unique to aerospace and defence industries that fosters recruiting, training, and retention of highly qualified people;
- Conduct technology and market seminars to introduce business to the opportunities within the aerospace and defence industry supply chain;
- Increase interaction and cooperation with the federal government and large multi-national companies in order to more evenly distribute Industrial Regional Benefits across Canada; and
- Expand, in scope and frequency, the training for the national and local military procurement process.

Return on Investment

The Government of Alberta is focused on creating the conditions that will help Alberta businesses thrive. As such, Alberta will measure its success in achieving its goals, anticipates reaching them by 2015, and will know it achieved them when:

- Alberta's aerospace and defence revenue continues to grow at a rate of 5–7%, per annum.
- Alberta's aerospace and defence sector revenue equals 8% of the national market, 2% more than the province's current market share.

  The above two measures indicate that Alberta is developing the industry and that the province's niche clusters are competitive outside Alberta. They also infer a successful program of investment attraction and trade assistance, as the global market is growing faster than the provincial market.

- 50% of Alberta's aerospace and defence enterprises are members of a provincial industry association.

  This measure indicates Alberta industry confidence in the provincial industry associations, which are the ideal non-proprietary vehicles for government industry development. These associations promote development of the sector as a whole, and are good indicators of

collaboration present in the sector – a strong association usually indicates a strong willingness to work together towards a common vision.

- 80% client satisfaction when queried on the role of government in attracting investment and facilitating foreign trade.

  This measure is one method of assessing government's efforts to increase the sector's global competitiveness.

Developing a return on investment for this strategy is difficult, as the detailed planning and costing of initiatives will occur in the follow-on action plan to implement the strategy. However, it is possible to describe what the environment would likely look like in 2015 when this strategy has been successfully carried out.

- In 2015, Alberta's aerospace and defence sector would not be just an industry sector; rather, it would be a cluster formed by industry, academia from all age groups, federal and provincial governments, and both profit and non-profit organizations working together. This sector would have a common vision for Alberta's future and would have detailed individual strategies that contribute to the furthering of the sector.
- Elementary and secondary schools, the Canadian cadet organizations, and museums would work to raise the awareness of Alberta's proud heritage and future in aerospace and defence. By knowing where the sector came from and providing early education, the sector will entice youth into aerospace and defence fields.
- Post-secondary institutions will work hand-in-glove with industry in the delivery of programs in space, aeronautics, aviation management, electronics, and robotics. There will be program chairs and research facilities that are sponsored by both industry and government, and the programs will have been designed in parallel to industry's creation of cooperative education, apprenticeship, and career opportunities within the sector in Alberta.
- The economic benefits to the province will be realized through the growth in size and number of companies operating within the province. These companies will come to Alberta or grow their existing business lines of operation because the government will have successfully created an environment that supports innovation and growth with real tools that increase the jurisdictional advantage of Alberta. Stakeholders will help the sector realize those strategic opportunities to expand product lines and stay on the leading edge of technology.
- Alberta will be looked at by the rest of the world as the home of unmanned vehicle systems, adaptive MMRO operations, defence electronics, and space science and aerospace geomatics. This reputation will act as a siren to enterprise from around the country and the globe; companies will want to be part of this exciting centre of expertise in a province that is growing and demonstrating action towards diversifying its economy and building on success.

- We will be hailed as an example of the type of host-province that Canada's military needs. Our communities will have tremendous relationships with our bases both personally and in business. The day-to-day needs of our four bases will be met by local businesses, and Alberta businesses will be competitive and successful in pursuing national military requirements.
- Most importantly, Alberta's aerospace and defence sector will have reached this success through the leadership and hard work of industry, academia, associations and organizations, and government.

PART III:

How do we get there?

A Vector to Diversity: Alberta's Aerospace and Defence Industry Strategy has been developed in conjunction with stakeholders from government, industry, academia, and associations, to recognize that aerospace and defence is a strategic industry sector for Canada, and that Alberta can and should play a key role in contributing to, and improving ,the nation's standing as the fourth largest aerospace sector in the world. The industry is technology dependent, and that technology can only be developed and maintained by very highly-qualified and skilled people trained and experienced in aerospace and defence. It is imperative that the Alberta government, in concert with the provincial industry associations, work jointly with the Government of Canada, academia, and individual enterprises to foster the following:

- Development of new technology and products;
- Development of sector businesses in Alberta; and
- Development of opportunities for Alberta companies outside the province.

This strategy will be managed by a cross-government team led by Alberta Finance and Enterprise, but with equal interest and commitment from other Alberta ministries, including Advanced Education and Technology, Culture and Community Spirit, Employment and Immigration, International and Intergovernmental Relations, and Transportation. This team will be the core of a larger Stakeholder Group, which will include representation from all levels of government, industry, academia, and associations.

Vision

The Alberta aerospace and defence industry will increase global competitiveness in targeted niche segments by being home to highly-qualified and skilled people in academia, industry and government, who are committed to creating innovation and commercial success.

Goals

The strategy has four long-term goals, which will be simultaneously developed. However, the cluster's stakeholders will adjust and shift priorities, through short-term action plans, in order to compensate for any goal(s) that are lagging.

1. **Business Development of the Sector.** Alberta recognizes that its current success in aerospace and defence stems from the entrepreneurial spirit, initiative, and provincial pride of existing companies, as well as Alberta's favourable market environment. The province is committed to helping industry continue its growth and prosperity by facilitating business development activities that will create an overall environment rich in opportunity for individual companies. Stakeholders will determine sector gaps, and then work to fill those gaps by providing information, networking opportunities at home and abroad, seminars, and programs. Government will work with industry to seize opportunities that establish new niches, increase productivity, and bring technology to market. Another important aspect of this goal is the development of the areas that enable growth: Alberta's strong aerospace infrastructure, proud aerospace/aviation heritage, and an educational network that demonstrates strength in aerospace and defence.
2. **Niche Cluster Competitiveness.** Alberta will build on existing success in niche clusters to create synergies and attract both complementary businesses and highly-qualified and skilled people into the cluster. By focusing its efforts, the province can realize the most value for its investment, and create a clearly identifiable international focus for trade and investment attraction. Furthermore, focusing on niche clusters will allow easier alignment between government, academia, and industry to achieve the objectives of being globally competitive, investing in the future, and increasing the required sector development.
3. **Global Competitiveness.** This goal involves ensuring policies, tools, support, and networks are established to make Alberta competitive on a global scale within the aerospace and defence sector. It involves government working with academia, industry, and associations to attract foreign and inter-provincial investment, as well as playing a role in global networking to increase the sector's exports. Achieving this goal will enhance and develop Alberta's reputation as a province that is supportive and welcoming to aerospace and defence industries.
4. **Continuous Investment in the Future.** Realizing this goal ensures Alberta is prepared for the challenges of the future, and involves investment in tomorrow's labour force, tomorrow's technology, and tomorrow's infrastructure. The Government of Alberta will partner with industry and academia to ensure that there are the educational programs, and high-tech co-op and career opportunities needed to recruit, retrain, and retain highly-qualified and skilled people within the provincial aerospace and defence sector. Similarly, government will continue to develop the mechanisms to support early technology growth. This will help ensure that the province's researchers remain on the leading edge of technology, even as current technology comes to market. This will require the infrastructure to create success, and Alberta Finance and Enterprise will champion an inter-departmental approach to ensure that the airports, information systems, and airspace are available to industry to maximize the development of opportunities.

Action Plan

In 2010, the Alberta government will initiate a series of working groups with stakeholders from around the province, and throughout the aerospace and defence industry, to develop the action plan that will implement this strategy. These working groups will further develop the specific initiatives required to meet the goals, as well as as well as the associated tactics and activities. Most importantly, these working groups will ensure that initiatives are led by the most appropriate entity. Industry and academia will each have their own responsibilities, and only the initiatives that lie within provincial mandates will be captured in the government's action plan. Each stakeholder's plan will be aligned and coordinated to best achieve the goals and vision set herein.

A measure of effectiveness will be developed for each of these initiatives followed by specific tasks and/or deliverables. These can be further broken down by individual economic development agencies, companies, or associations in business plans that would be able to show linkages back to Alberta's vision. The action plan will be the template to plot a critical path of prioritized initiatives - a flight plan to success.

Certain initiatives should be considered when developing the Alberta government's action plan. Grouped by goal, these possible initiatives include, but are not limited to:

Initiatives to Achieve Business Development of the Sector.

- These initiatives will include as a minimum, the following:
  - Developing, strengthening, and empowering Aviation Alberta to act as the primary provincial aerospace industry association.
  - Encouraging the development of an industry association focused on non-aerospace related defence industries that will work cooperatively and in parallel to Aviation Alberta.
  - Developing business/productivity tools, workshops, and business intelligence to Alberta's aerospace and defence industry sector to ensure global competitiveness.
  - Developing rural and northern economic development partnerships within the provincial network of Regional Economic Development Alliances in order to actively engage industry and regional communities across the province in numerous aerospace and defence related initiatives. These tools will also be used to encourage cross-sectoral diversification within the industry, so that a company that is primarily serving one market will also expand into aerospace and defence.

Initiatives to Achieve Niche Cluster Competitiveness

- Examine ways and means to encourage niche cluster competitiveness, facilitated through industry associations, to incubate initiatives within the sector. It could also be used to research the viability of various new technologies or applications (e.g., alternative energy in aerospace, lighter-than-air vehicles, or creating a robotics centre of excellence). Examples of where these efforts would be useful are in helping companies develop an UAV training centre in Alberta, or incubating the use of UAVs in civilian applications within Alberta.

Initiatives to Achieve Global Competitiveness

- Review the Government of Alberta's policy on industrial incentives with a view towards ensuring Alberta remains globally competitive in terms of investment attraction and trade.
- Examine ways to enhance international marketing within government to enhance business development, trade, and investment attraction. Although similar to a technology commercialization demonstration, business demonstrations could be focused on highlighting existing technology in a new application, or to a new customer. These types of events would be coordinated where appropriate with the federal government, the demonstrating company, and the potential clients.

Initiatives to Achieve Continuous Investment in the Future

- Investigate the feasibility of developing an aerospace and defence work force strategy that focuses on recruiting, retaining, and training highly qualified and skilled labour force for tomorrow's aerospace and defence industry sector in Alberta. This strategy would consider enhancements to aerospace and defence related education in both K-12 and post-secondary institutions.
- The Government of Alberta could also work in conjunction with its colleges and universities to develop post-secondary programs specializing in aerospace and defence, beyond the current programs in place. These programs would need to be developed in collaboration with industry to ensure they meet emerging needs and that there are co-op opportunities and careers available to Alberta students and graduates.
- The Government of Alberta will consider the resources required for airport infrastructure.
- Develop a mechanism that will both focus and contribute to the research and development of technology in the aerospace and defence industry.

CONCLUSION

This aerospace and defence industry strategy outlines the vision and goals that the Government of Alberta deems necessary for this sector to be a viable and substantial part of a robust diversified Alberta economy. By having specific and succinct goals, government will be able to prioritize initiatives that are working towards the single articulated vision. Specific measures of effectiveness, to be developed as part of the action plan, will permit all Albertans to assess the sector's progress, and allow the Provincial Sector Team to adjust priorities and efforts to respond to the changing dynamics of the industry. Finally, by formally setting a single vision that is specific, forward-looking, and achievable, all of Alberta's aerospace and defence stakeholders will begin to align, thereby creating synergistic growth. The specific goals are:

- **Business Development of the Sector;**
- **Niche Cluster Competitiveness;**
- **Global Competitiveness; and**
- **Continuous Investment in the Future.**

It is through the contributions made by all industry stakeholders that Alberta will maintain and grow its position as a key player in the aerospace and defence sector globally. Alberta possesses the means to develop and promote its reputation for entrepreneurship and excellence, and to contribute to the growth of future generations of a leading-edge industry.

This strategy was written within the context of complementary strategies and reports, including:

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